



Projecting Fatalities in Crashes Involving Older Drivers

Oak Ridge National Laboratory, USA

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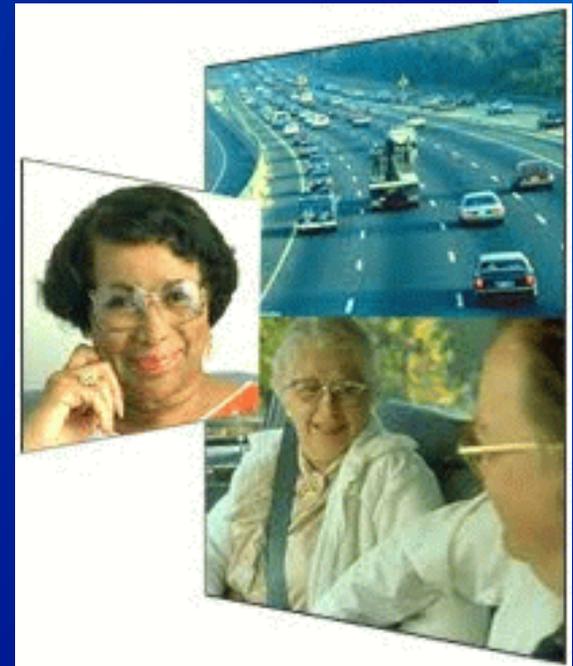
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Objective

To project the size of the safety problem involving future elderly cohorts, by taking into account driving behavior, population migration, personal wealth and health, infrastructure, and technological impacts



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Prediction Approach

We develop models to predict:

- The number of older drivers in the future who will still be driving (for age groups 65-69, 70-74, 75-79, 80-84, 85+) in U.S. by gender and geographic area
- The number of miles driven annually per driver by each age group of older drivers
- The crash risk by age, gender, and region
- The projection horizon is from year 2000 to 2025

Projected Number of Older Drivers

= Projected Population X Probability (Continue to drive)

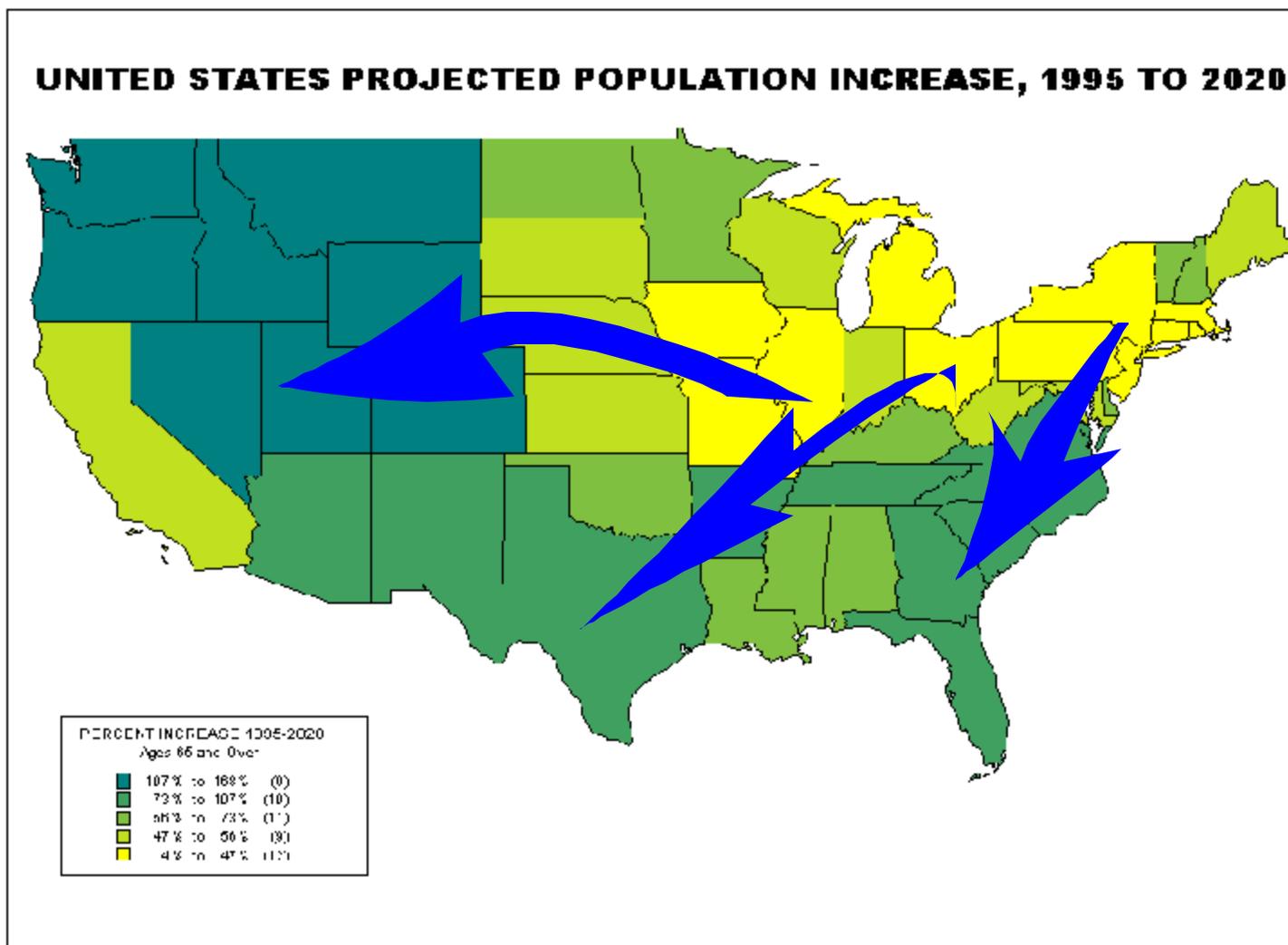
Pop.
Projections

	2000		2005		2020	
	Male	Female	Male	Female	Male	Female
65-74							
75-84							
85+							

Probability
Driving

	2000		2005		2020	
	Male	Female	Male	Female	Male	Female
65-74							
75-84							
85+							

Population projections are official U.S. Bureau of Census' figures.



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Based on the literature and our previous analysis, decisions to continue to drive are based on:

- **Age, income, employment status**
- **Chronic health conditions as reflected in functional limitations**
- **Factors contributing to elderly drivers' decisions to continue to drive vary by gender**



Data limitations

No single data source contains all basic information

Nationwide Personal Transportation Surveys

~~Functional/health indicator~~
Driving status
Demographics
Other drivers in hh

National Health Interview Surveys

Functional/health indicator
~~Driving status~~
Demographics
~~Other drivers in hh~~

Building a bridge that links NPTS and NHIS?

Nationwide Personal Transportation Surveys

~~Functional/health indicator~~

Driving status

Demographics

Other drivers in hh

National Health Interview Surveys

~~Functional/health indicator~~

~~Driving status~~

Demographics

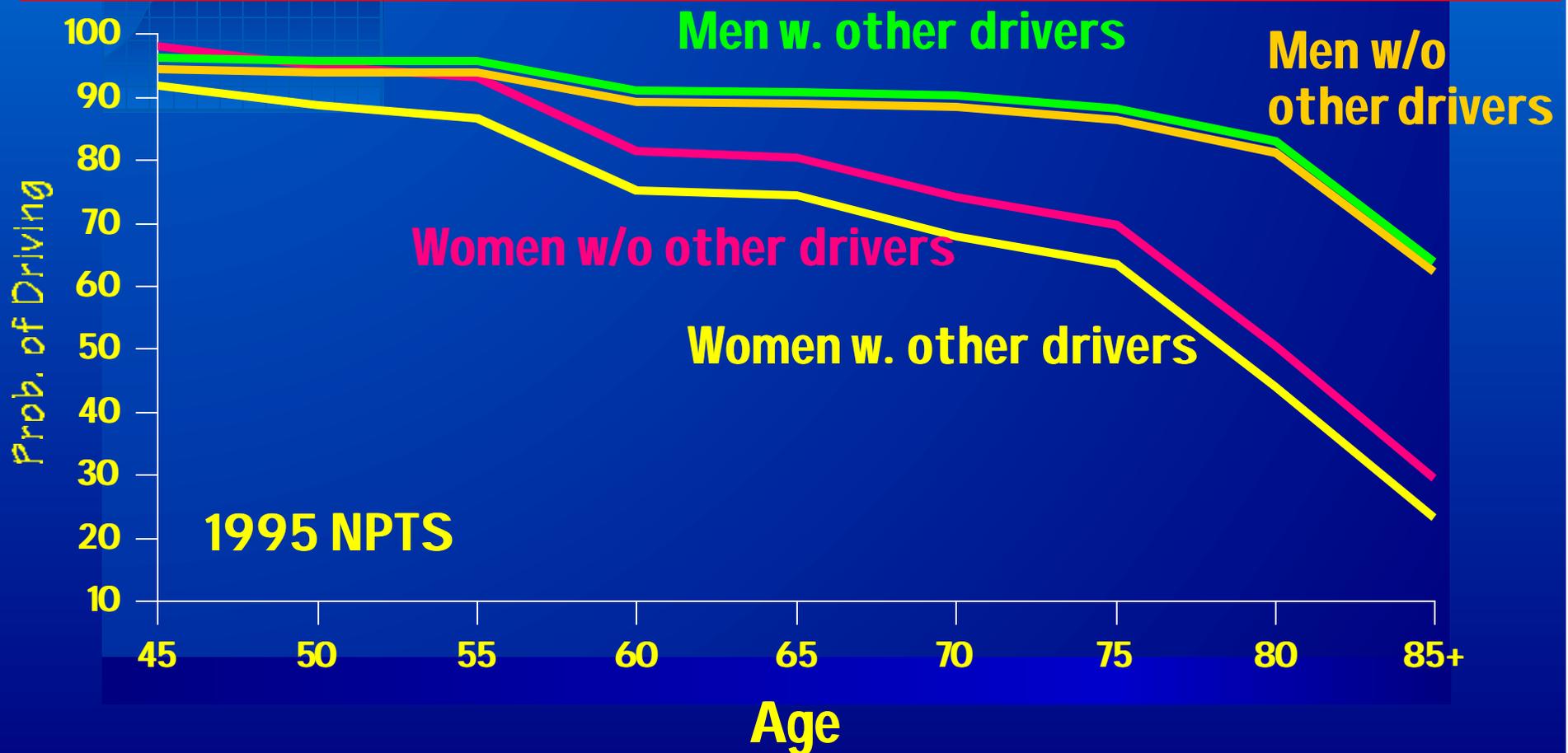
~~Other drivers in hh~~

"Simulated" health status = f (demographics)

Based on '90 and '95 personal travel surveys and simulated health status, we found that an older driver's decision to drive decreases with:

- **Living in an urban community**
- **Being out of the labor force**
- **Having lower income**
- **Having other drivers in household, the impacts of which affect men and women differently**
- **Being functionally disabled**
- **Age**

Availability of other drivers in the household has a greater impact on older women's likelihood of continuing to drive



Based on '77, '83, '90 and '95 NPTS, we found that drivers with the following attributes drive more miles

- **Being a healthy male**
- **Having higher income**
- **Not having other drivers available in the household**
- **Being in the labor force**
- **Being younger**

Ideally, a crash risk model should be based on data from individual drivers similar to the “driving” and VMT models.

- **Unfortunately, data limitation prohibits the model development to be based on individual drivers' data**
- **Instead, the crash risk model is based on aggregate information on drivers from specific age/gender/region categories**
- **Consequently, the crash risk model is not as robust as it could be with a larger sample**

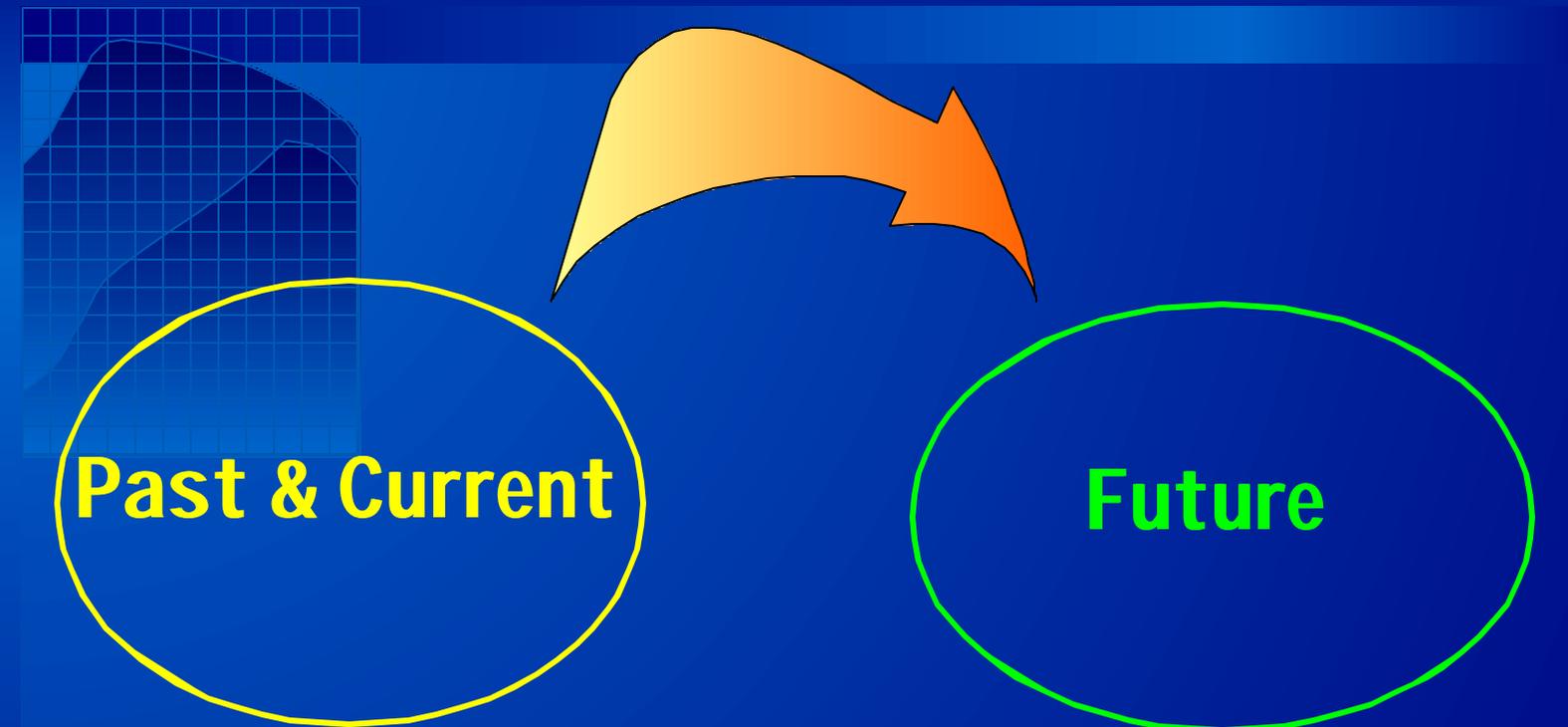
Based on official U.S. fatality data, we found that an older driver is more likely to die from highway crashes if the driver

- **Is older and poorer**

- **Does not use a seat-belt.**

The greatest benefit of using a seat-belt is in the oldest age group (85+). The benefit of seat-belts is less age-specific in other age groups.

- **Resides in the southern region of the U.S.**



Past & Current

Future

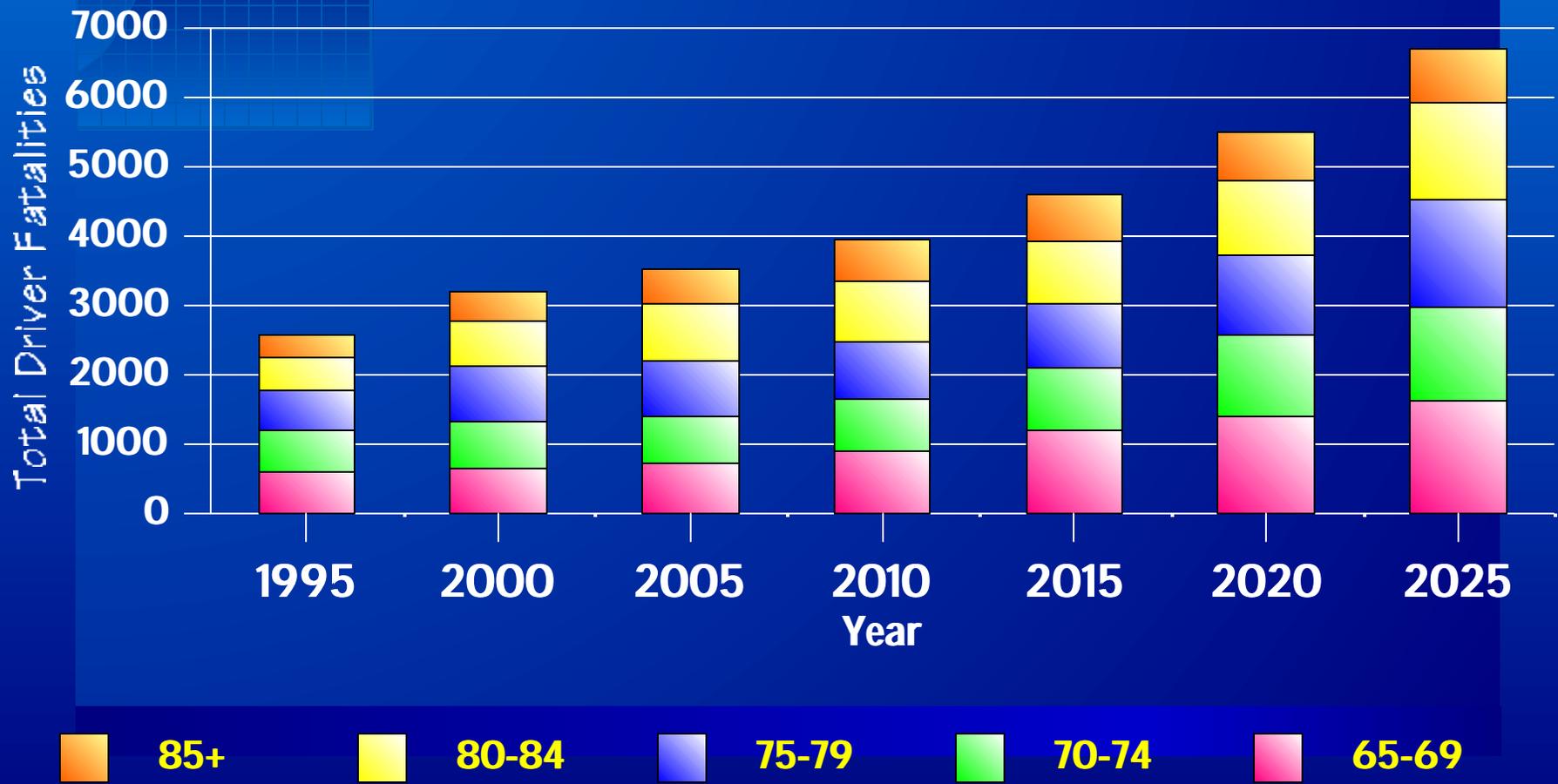
To project the future based on the past, we are constrained to factors (e.g., driving determinants) for which reliable projections are possible.

For example, challenges in projecting the probability of continuing to drive:

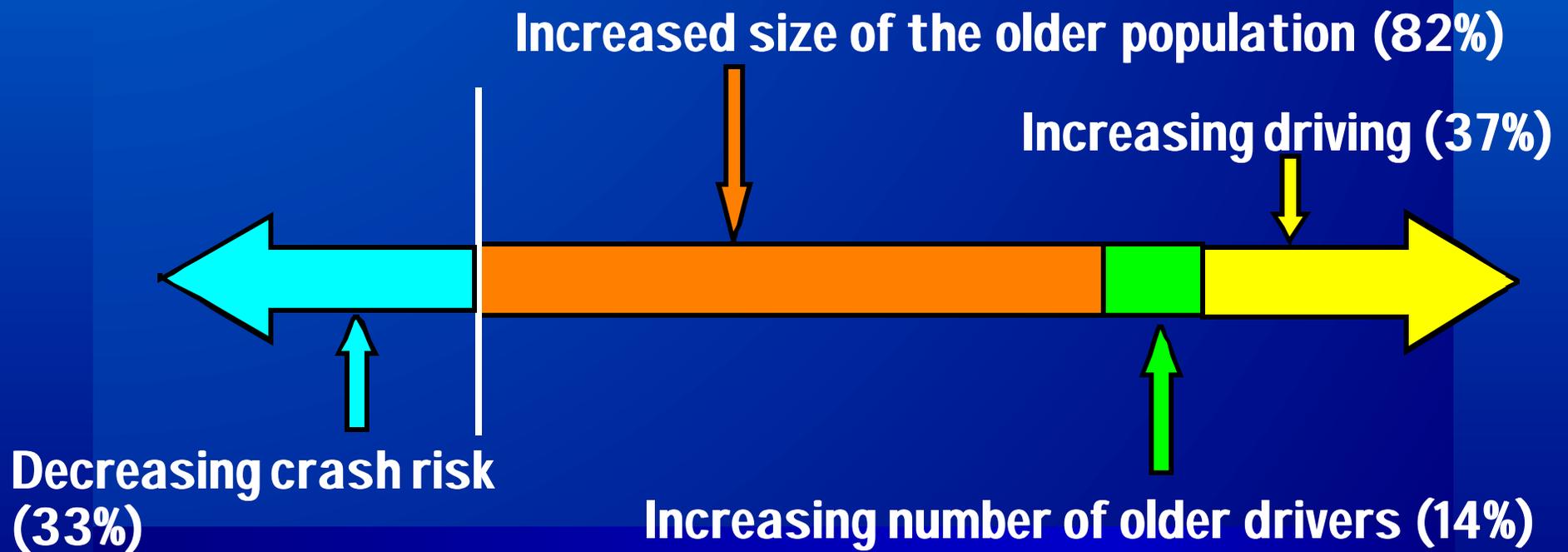
- An understanding of what influences older drivers' decisions to drive – based on historical data
- An understanding of what future directions are likely to “alter” historical trends
 - Healthier, longer life expectancy, more financially secure
 - More accustomed to driving
 - Safer vehicles and roads (ITS)

Projected Older Male Driver Fatalities

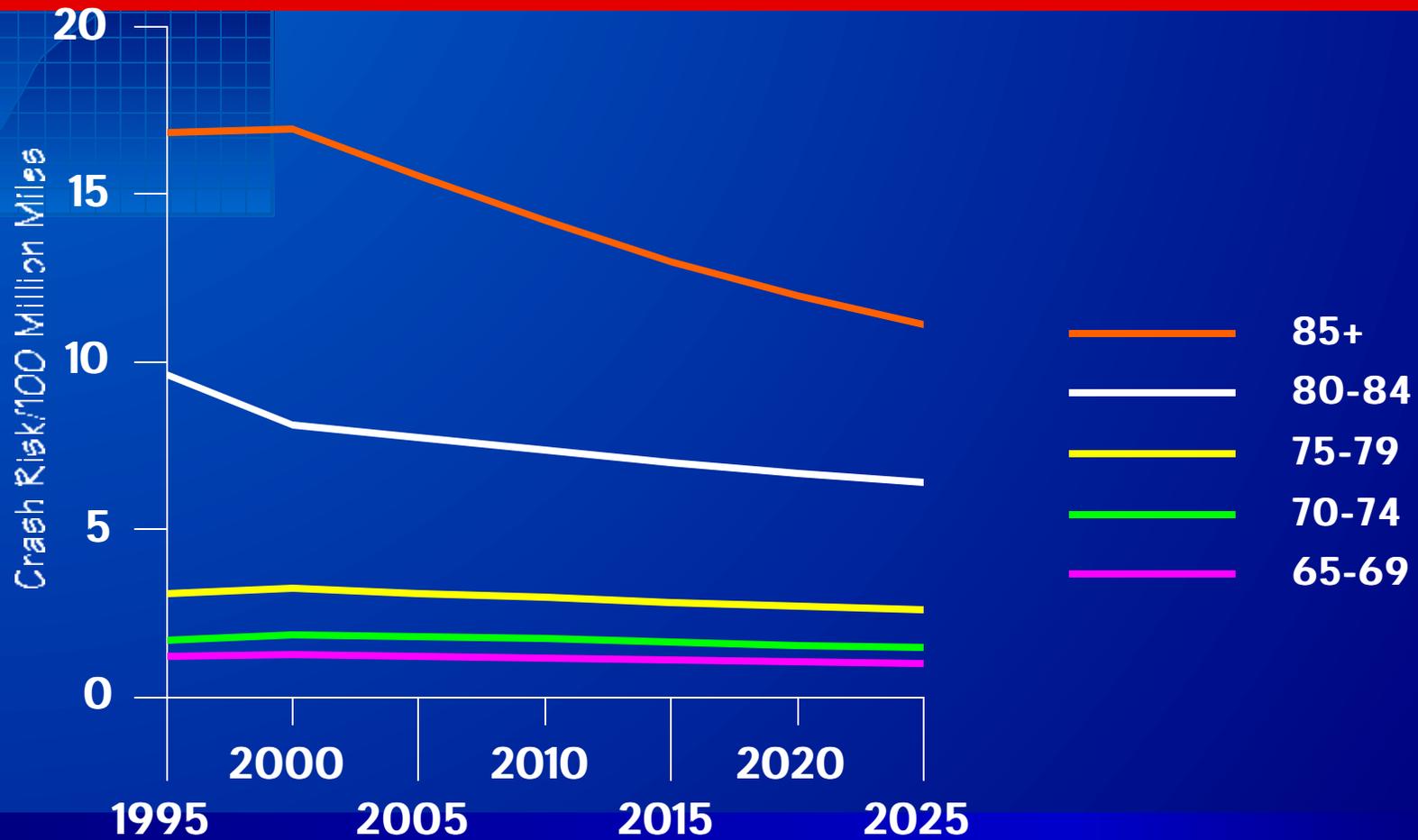
1995-2025



Fatalities of older male drivers in 2025 projected to be almost triple that in 1995. This is due to:

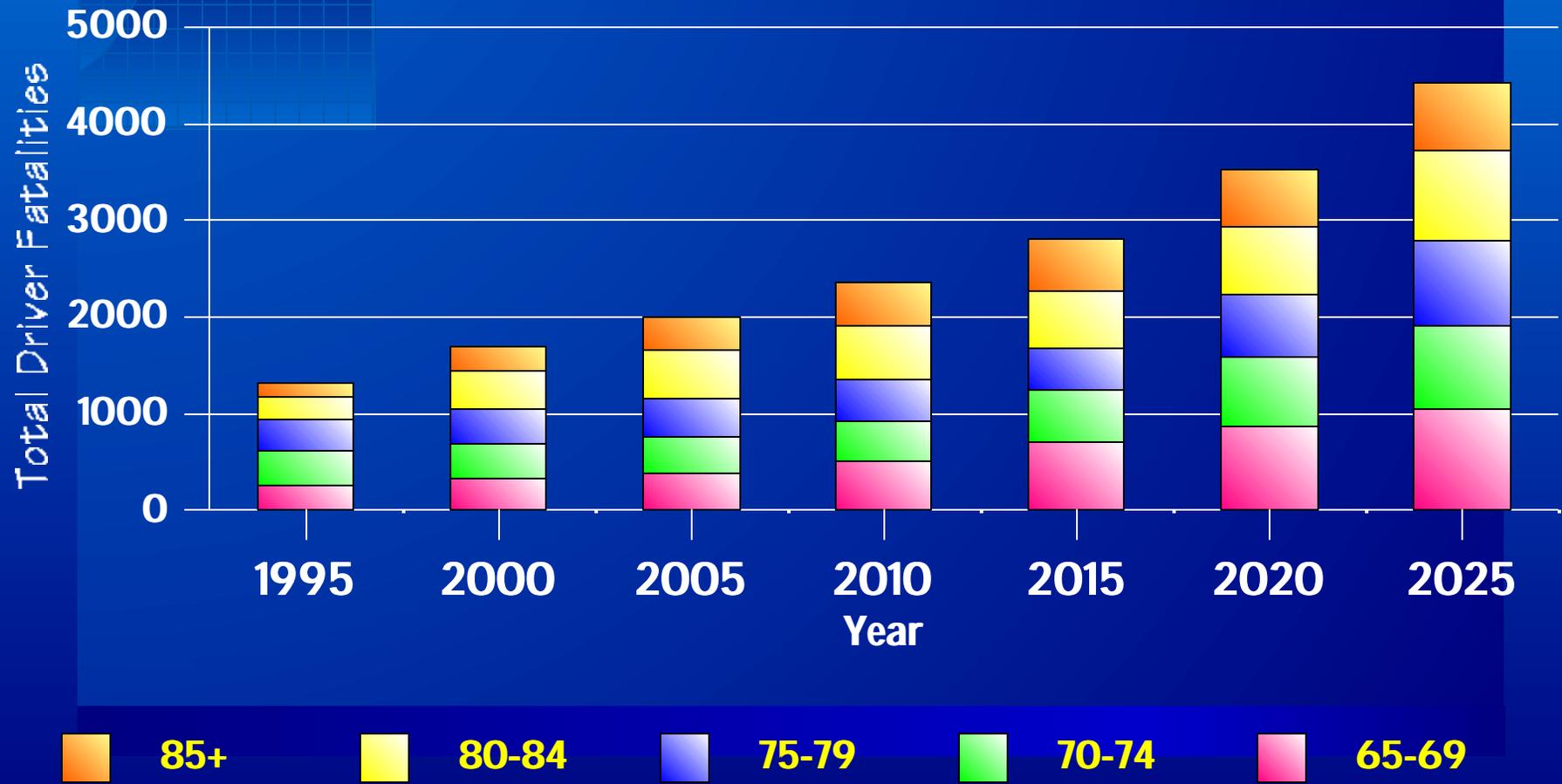


Crash risk of older male drivers decreases over time

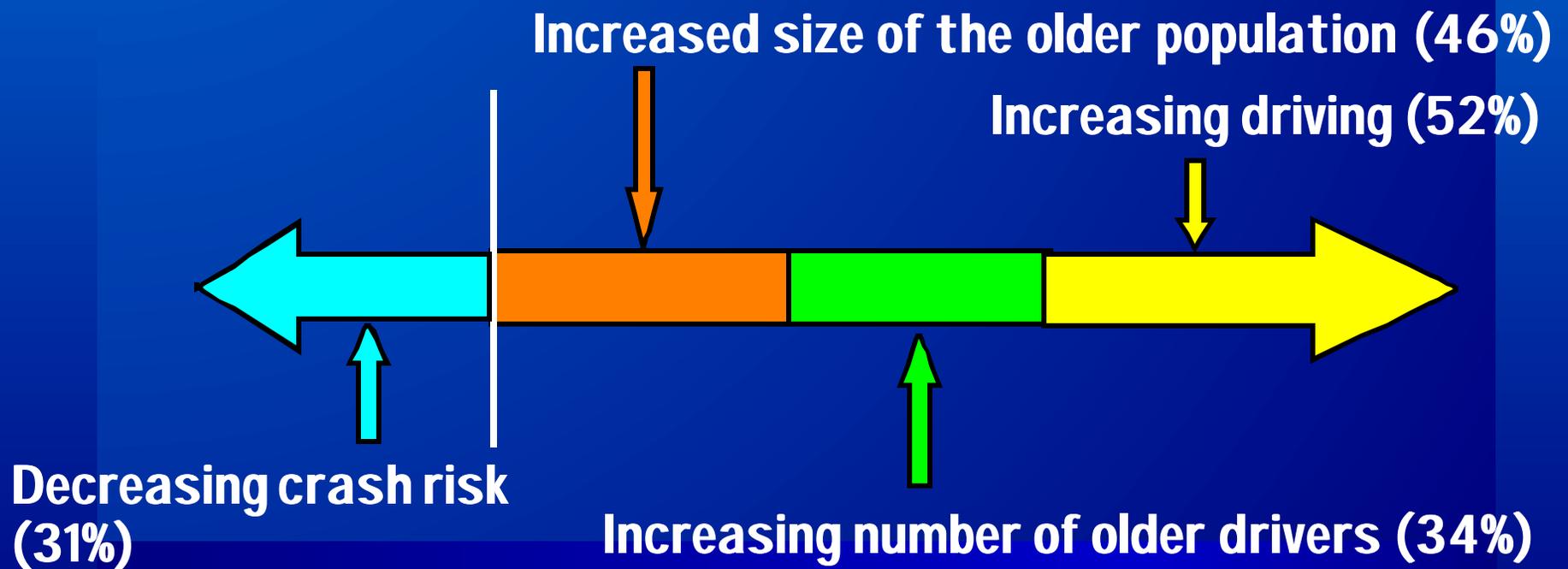


Projected Older Female Driver Fatalities

1995-2025



Similarly, fatalities of older female drivers in 2025 projected to be more than triple that in 1995. This is due to:





Our results suggest that

- **The increasing volume of older population contributes significantly to the increase in highway fatalities involving older drivers**
- **Decreasing crash risk suggests that future older drivers and vehicles are “safer” in 2025 than that in 1995. This might be attributable to: (1) drivers are more accustomed to driving, and (2) safer vehicles and roads (ITS) – more research is needed!**

Projected fatalities is for the worst scenario. Because

- **Projected VMT is at the high range of reasonable projections**
- **Projected fatal crash rate may decrease faster than our projections**
- **Safety programs (e.g., ITS) may reduce fatality rates. Unfortunately, data are not available at this point**